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MEMORANDUM FOR MR. T.D. WOODBURY:

MANAGEMENT PLANS FOR THE NORTH ADIN WORKING CIRCLE, MODOC N.F.

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BERKELEY, CALIFORNIA
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MEMORANDUM FOR MR. T. D. WOODBURY:

MANAGEMENT PLANS FOR THE NORTH ADIN WORKING CIRCLE, MODOC NATIONAL FOREST

At a conference with Messrs. Dunston, Beeson, R. Bacon, and F. Bacon at Hackamore, Modoc National Forest on August 11, 1936, the objectives and methods of marking and timber management in the Badger Unit and in the North Adin Working Circle entered into the discussion. It was suggested that I go over the stands in the Adin area with F. Bacon and discuss with him the entomological features of marking and management as they appear to apply under the conditions in the working circle.

Entomological factors are basic elements in the management problems of the Adin working circle and in the problems concerned with the management of many other eastside areas. They may determine the success or failure of the efforts at sustained yield management. For that reason, this memorandum has been drawn up to review our experience insofar as it may apply to the management problems of the Adin area.

As I understand the contemplated plans for the management of the working circle, the Forest Service hopes to reduce losses, both before and after logging, and to place the stands in the working circle on a sustained yield basis by (1) a light cut, (2) a rapid coverage of the area and (3) a rigid selection of trees to be cut. The selection is to utilize a studied appraisal of each tree and an estimation of risk of mortality during the period following logging. It will not necessarily follow the present selection system.

Review of Conditions

Although no detailed surveys of insect-caused losses have been made in the working circle it is known that, in many parts of the area, losses have been heavy for a number of years. An average mortality figure of 25% of the stand for the area as a whole appears to be a fair estimate. In the poorer sites, insects appear to have killed as much as 50 to 60% of the timber. In the better sites losses possibly have not exceeded 15%, although rapid depletion of values has occurred recently. The overmature age classes of ponderosa and jeffrey pine predominate. They constitute the major portion of the merchantable material. In many parts of the area there are few young individuals and the trees, although of small diameter, are overmature. Bacon has found that all but the youngest and most thrifty trees are not putting on a satisfactory amount of increment.

The physical factors of the environment appear to be the critical ones. In many parts of the area soil conditions are poor. Those factors that constitute climate have been so out of balance that the individual trees over entire areas have shown a rapidly decreasing growth rate or have succumbed in large numbers. Many observers are confident that the physical factors of the environment are basically responsible for the creation of the insect problem under such conditions. However, because of the extreme complexity of the relationships of all factors that enter into the situation there is little definite experimental evidence to back up the observational

The deficiencies of the physical factors lead directly to reduction in growth, impairment of health and decreasing resistance to parasites on the part of individual trees and of the stands as a whole. The same conditions apparently also lead to an increase in the effectiveness of normal populations of forest insects and furnish an opportunity for the building up of larger populations. The result is what may be seen today in some parts of the Adin area. Mature trees rapidly become decadent. Immature trees show all the characteristics of maturity as far as growth rate and general vigor is concerned. Individuals in all classes become weakened and succumb. Under other, more favorable conditions, experience has shown that many phases of the forest insect problem that now are important in the Adin area probably would not exist.

Light Cut

The success of a light cut will depend on its prevention of losses in the reserve following cutting. If environmental conditions in the Adin area remain as critical as they have been during the past few years there is reason to believe that a light cut will have little effect on the infestation. Our experience on Timber Mountain showed that the rate of loss continued without much change following cutting. The cutover survey of 1934 showed that, where cuts of around 70% of the original stand had been made and environmental conditions were adverse, the losses in the reserve continued as in uncut stands. However, it is to be assumed that a light cut, with a limited mill capacity, will increase the acreage covered by the operation in a given length of time. Our experience on the Timber Mountain project indicated that a larger portion of the stand may be utilized when that happens than would be the case if a heavier cut was made on a smaller acreage.

Not all of the working circle can be considered in the same light. There are some areas in which, even under the conditions of today, resistance of many of the trees in the stand may be sufficient to prevent excessive loss if the high risk trees were removed. If, as many seem to think, more favorable climatic conditions will occur during the next few years, it is entirely possible that a larger area can be cut lightly with little danger. The element of chance appears to loom large in determining the possible success of the light cutting method. In addition, the matter of selection of trees for the first cut is important. That will be considered later in detail. However, the variation in environmental and stand conditions appears to me to require an extreme flexibility of action.

For example, we may consider some of the small, isolated bodies of timber that lie in the canyons east of the Adin-Canby highway. At the margins, which usually are on ridge tops or flats, all but a few trees, almost regardless of age, show definite signs of decadence. Not fifty yards from the margins - usually towards the center of the island and in the canyon bottom, there are but a few trees that exhibit definite signs of decadence. If the prevention of insect losses in the period between the first and second cuts is an objective of the work, it appears likely that a very heavy cut at the margins and an increasingly lighter cut as better conditions are encountered might accomplish the purpose. Spacing, assurance of reproduction and removal of decadent overmature or weakened trees of any merchant-

able class would be in order in the better sites. As most of the trees on the margins are weakened the job would be to find trees in the fringe stands that showed some promise of living through the rotation cycle and could be left as reserve.

A heavy cut or cutting of any sort on marginal areas is being criticized in Forestry circles on the ground that it merely increases the rate of extension of non-timbered areas by creating extremely unfavorable environmental conditions for tree growth and establishment of reproduction. That may be so. However, a natural recession of the timber margin has been occurring in the area under discussion. Under those conditions it appears that it is a question as to whether or not values that will be lost should be utilized before they are destroyed.

Rapid Coverage

There is an estimated 487 million feet of timber in the Adin working circle of which 307 million is Government timber. The capacity of the present operation can be increased to about 6 million per year. Ordinarily from 2 to 3 M.B.M. per acre is left as a reserve. If we assume that a light cut method increases the reserve to 6 or 7 M.B.M. per acre it will take about 25 years to cut the Government timber and about 40 years to cover the working circle. The prevention of losses in uncut stands over the necessary period of time required for coverage enters the problem. It is suggested that an organized salvage logging or maintenance control policy should be included in the plans. Perhaps a mobile unit that would salvage log the better quality stands might be organized by the operator. Unless administrative difficulties were encountered, it is possible that felling and yarding or treating by the CCC organization could be fitted into the salvage and maintenance control program that experience has indicated may be a necessary part of the work.

Tree Selection

In selecting trees for marking there are several considerations other than those concerned with the risk of attack by forest insects. In the following discussion it is obvious that those considerations have not been examined in detail and have been subordinated to the entomological phases of the problem.

Under present conditions practically all except the younger age classes are slow-growing. Person found slow-growing trees were selected for attack by forest insects. However, the present stand conditions may be ephemeral and, before many years, recovery of the growth rate and vigor may be the result of more favorable environmental conditions. Present conditions certainly can be considered abnormal. They are the result of unusual pressure of the environment on the stands and of favorable conditions for insect activity.

In the better sites the selection of trees for cutting under the systems developed by Dunning and Keen appears to give good results. However, losses occur in all the tree classes set up in both systems. No class is immune. Some trees in all classes are selected for attack either by chance or because of susceptibility of the individual. The greater the environmental

pressure the more even are the loss figures for all classes. Because of this, the selection of trees of high risk and the leaving of some reserve becomes a matter of treating with the conditions of individual trees regardless of class. The necessity for this treatment is greater the greater the pressure of environmental factors.

Bacon has found, in classifying trees in the Adin stands according to risk, that many small but overmature trees fall within the limits of the high risk class due to poor health and a decadent conditions. In addition, trees in classes it is ordinarily considered desirable to leave should be removed because of the poor health of the individuals. He also has considered some trees in Dunning's classes 4 and 5 which ordinarily should be removed, apparently are better risks than trees which belong in the younger and more thrifty classes. I believe, from such observations as I have been able to make, that there is an entomological basis for his selections.

Examination of some trees he had classed as poor risks revealed incipient flathead infestations were present in them although the trees were green. Other trees, classified as leave trees because of an apparent good health and vigor, harbored no flatheads. I judge incipient flathead infestations are very abundant in the Adin area. The abundance of this type of infestation in other eastside areas is indicated by the results of a recent examination of the Timber Mountain plots. The 251 merchantable green trees now on the 40 acres included in the two plots were examined for flathead infestations and classified according to the presence of infestation, suspected presence, or absence of any indications of attack. 127 trees contained broods in the very young larval stages. It was suspected that 61 more green trees contained broods in the upper bole and 63 showed no evidence of infestation. On Harvey Mountain in the Lassen National Forest, 7 of 14 and 9 of 21 trees were infested in two areas on a cruise plot in which past losses have been heavy. In another nearby area in which losses have not been heavy but 2 of 62 trees contained infestations. Near Glass Mountain, in the Modoc National Forest 22 of 51 trees were infested. All these trees would have been considered green and uninfested in any classification made previous to this year.

Practically nothing is known of the effects of flathead infestations on trees. However, flathead infestations are to be found in areas in which heavy losses have been suffered. Flatheads have appeared as advanced infestations in about half of the 1283 trees that have been examined in the study of composition of infestations in both east and westside types. The evidence is clear that they have initiated attack in nearly two thirds of those trees and, if the species has a two year life history they may be considered the primary species in a much greater number. They appear to be concerned in the losses that would be included in a normal mortality table for given stands under given conditions. It is possible that the incipient flathead infestations are the cause of or an indication of high risk. Flathead infestations occur in many of the trees that exhibit signs of poor vigor and of decadence. If true, the diagnostic characteristics used by Bacon, i.e., thin foliage, dead branches, evidence of decadence, etc., in determining the degree of risk appears to have an entomological basis.

The behavior of the western pine beetle and of the Oregon engraver beetle in causing losses of groups of trees indicates such loss may be considered abnormal. It is supplemental to and over and above what might be considered the normal mortality for a given stand under given conditions. The fact that selection of weakened trees or of those in the susceptible tree classes is abandoned at the group stage of an infestation makes it difficult to agree that any selection and removal of trees will have much effect when such outbreaks occur unless the stand is thinned by a heavy cut. However, it seems possible that the hazard from outbreaks in reserves on cutover lands may be lessened by the selection of individual trees on the basis of health due to the fact that material that is satisfactory for building up large populations would not be as abundant. It also appears possible, if the recommended salvage logging or maintenance control in the uncut stands or in the cutover lands carrying a heavy reserve is carried on, to break up the tendencies toward an abnormal outbreak and prevent an influx of beetles from adjacent infestations.

Respectfully submitted,

K. A. Salman, Associate Entomologist
Berkeley, California
September 21, 1936